

REMARKS

I. OVERVIEW

Claims 1-25 are pending in the present application. Claims 1-5, 9-13 and 15 have been amended. The Office Action indicates claims 16-25 are allowed, claims 1-7 and 9-15 are rejected and claim 8 is objected to.

Applicants have amended the specification by deleting paragraphs from page 4, line 12 through page 6, line 6; page 6, line 25 through page 7, line 8; and page 18, lines 4-7. The specification has been further amended at page 8, lines 12-17 by amending the term "gas diffusion halls" to "gas diffusion holes"; page 18, lines 8-23; page 21, line 8 wherein the feature of parallel light is "integrated to a certain point"; and page 25, line 21 describing the present invention "implemented using laser source having a predetermined wavelength without the use of the IR lamp from Gilway." Support for these amendments can be found in the specification, for example at page 17 wherein the "plurality of diffusion holes" is set forth and described; page 21 wherein the paragraph explaining Figure 17 provides further explanation of the integration of the optical source; and page 20, lines 19 through 25 describing variations of simulations of the optical cavity.

II. DRAWINGS

The Examiner indicates replacement drawings are required to designate a legend in "at least Figures 1, 2 and 4." Applicants have amended Figures 1, 2, 3 and 4 to include the designation "Prior Art" in accordance with MPEP §608.02(g). The corrected drawings are attached to the Amendment and labeled as "Replacement Sheets" in accordance with 37 CFR

§1.84(c). The legend designating Figures 1, 2, 3 and 4 as "Prior Art" is supported by the original disclosure wherein the Brief Description of the Drawings at [0050] states "FIGS. 1-4 illustrates an optical gas sensor of the prior art." Applicants therefore respectfully request the Examiner withdraw and reconsider the objection to the Figures.

III. CLAIM REJECTIONS – 35 U.S.C. §112

Claims 3/1, 5, 10, 13/11 and 15 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particular point out and distinctly claim the subject matter which Applicants regards as the invention. Specifically, the Examiner states that claims 3/1 and 13/11 recite the limitation "plurality of gas diffusion halls" with insufficient antecedent basis. The Examiner also states the limitations "the support plate" in claim 10 and "the horizontal support plate" in claim 15 lack antecedent basis. Finally, the Examiner states the term "advantageously" renders the claim indefinite.

Applicants have amended claim 3 to depend from claim 2, replacing the multiple dependent claim depending from claims 1 or 2. As a result, there is proper antecedent basis for the term "plurality of gas diffusion holes." Similarly, claim 13 is amended to depend from only claim 12, providing proper antecedent basis for the term "plurality of gas diffusion holes." Applicants amended the term "plurality of gas diffusion halls" to a "plurality of gas diffusion holes" in accordance with the amendments to the specification set forth in the Overview.

Applicants have further amended claim 10 to refer to "the lower support plate of the gas chamber" and claim 15 to refer to "the lower or upper support plate of the gas chamber" to provide proper antecedent basis. Additionally, Applicants have removed the term

"advantageously" from claim 5. Therefore, Applicants respectfully request withdrawal and reconsideration of the rejections according to 35 USC §112, second paragraph.

IV. CLAIM OBJECTIONS

Claim 10 is objected to by the Examiner because of the phrase "the infrared optical," which should include the term "source." Applicants respectfully direct the Examiner to claim 10 wherein the term "the infrared optical source" does contain the term "source" as the Examiner requests. Additionally, Applicants have amended claims 1, 9, 11 and 15 to include the complete term "infrared optical source." Accordingly, Applicants request withdrawal of the objection and reconsideration by the Examiner.

V. CLAIM REJECTIONS – 35 U.S.C. §102

Claims 1, 2, 7, 9, 11 and 12 are rejected under 35 U.S.C. §102(b) as being anticipated by Martin (U.S. Patent No. 6,194,735). Applicants respectfully traverse the Examiner's rejection as there is no *prima facie* case of anticipation set forth. A *prima facie* case requires each and every element of the present invention to be disclosed in a single reference. MPEP §706.02 (requiring a reference to teach "every aspect of the claimed invention either explicitly or impliedly.").

A. Claims 1 and 11

The Examiner states with regard to claims 1 and 11 that Martin discloses a gas sensor comprising: a gas chamber for housing a sample gas; a gas opening for exhausting the sample gas from the gas chamber; an optical source for projecting infrared toward the sample gas; and an infrared sensor for sensing the intensity of the infrared which has passed through the sample gas,

characterized in that: the wall of the gas chamber is composed of two opposing concave mirrors having different focusing distances but a common focus, and the concave mirrors have curvatures such that the incident light which is parallel to the axis of the concave mirror reflects on the surface of the concave mirror and passes through the focus of the concave mirror, and that the incident light, which has passed through the focus of the concave mirror reflects on the surface of the concave mirror and propagates parallel to the axis of the concave mirror. Applicants respectfully traverse the Examiner's rejection.

Martin fails to disclose each and every claim limitation of claims 1 and 11 as set forth by the Examiner, as required under 35 USC §102(b). Specifically, Martin fails to teach a "common focus" as well as differing focusing distances, found in the claims of the present invention. As a result, the claims depending from 1 and 11 are also not anticipated, as each and every claim limitation of the independent claims is not taught by Martin.

Martin discloses a gas sensor having three ellipsoid concave light-reflecting wall-parts (illustrated in Figure 8 as parts 11, 12 and 13, and termed "first," "second" and "third light-reflecting wall-parts" in claim 1). Martin further teaches that the three ellipsoid light-reflecting wall-parts have the same basic shape, and that the second and the third wall-parts (illustrated as 12 and 13 in Figure 8) are obtained, according to claim 1, by appropriate division of "somewhat less than half of an ellipsoid." Further, Martin teaches the focal points (*i.e.*, foci of the first wall-part, illustrated as 11 in Figure 8) are located in or close to mirror surfaces on the second and third wall-parts and vice versa. Moreover, Martin requires the dividing section mutually separate the remaining light-reflecting wall-parts (illustrated in Figure 8 as 12 and 13) and that the light-reflecting wall-parts are spaced at a given distance apart in the direction of the rotational axis.

As a result, the focal points of the three light-reflecting wall-parts cannot be located at a common point to form a common focus (Martin, col. 5, lines 12-35).

Martin adjusted its light-reflecting wall-parts to overcome the problem of an endless loop. It is understood by one having ordinary skill in the art that if two identical ellipsoid wall-parts are opposed to each other so that the focal point of each wall-part is located exactly in the opposing wall-part, the optical path of the gas sensor constitutes an endless loop. Such endless loop could not be used in a gas sensor. Accordingly, Martin used three ellipsoid light-reflecting wall-parts, instead of two, that have the same basic shape and thus the same focusing distances.

The present invention of Applicants on the other hand claims a gas sensor having two opposing concave mirrors having different focusing distances, with a common focus. In the present invention, the focal points of the two wall-parts are located at a common point in between two concave mirrors and forms a single common focus. This element of a common focus is not taught in the Martin reference.

Further, the two concave mirrors of the present invention do not have the same basic shape (*i.e.*, concave mirrors have different curvatures), therefore rendering mirrors that do not have the same focusing distances. This element of a differing focusing distance is not taught in the Martin reference. In the event that two identical concave mirrors are opposed to each other, so that the focal distance of each wall-part of the present invention were the same, the optical path of the gas sensor would constitute an endless loop, rendering an inoperable component for a gas sensor. As a result, Applicants utilized two wall-parts having different curvature and different focal distances from each other in the present invention.

Applicants have illustrated in Figure 8 and claimed in claim 1 of the present invention, incident light which is parallel to the axis of the concave mirror passes through the common focus (F1) of the concave mirror. Conversely, the incident light illustrated by Martin in Figure 8 shows it is unable to pass through the common focus, as a result of the three ellipsoids failing to have a common focus. To further clarify, Applicants have amended claim 1 to read "the incident light which is parallel to the axis of the concave mirror reflects on the surface of the concave mirror and passes through the common focus of the concave mirror, and that the incident light, which has passed through the common focus of the concave mirror reflects on the surface of the concave mirror and propagates parallel to the axis of the concave mirror." Claim 11 also contains the explicit requirement of the gas chamber "composed of two opposing concave mirrors having different focusing distances but a common focus."

As a result of Martin's utilization and teaching of different optical characteristics to solve the endless loop problem, Martin fails to disclose each and every element of the present invention. Accordingly, a *prima facie* case of anticipation has not been made. Therefore, Applicants respectfully request reconsideration and passage to issuance.

B. Claims 2 and 12

The Examiner states with regard to claims 2 and 12 that Martin discloses "said gas opening comprises a gas vent located at a certain wall of the gas chamber and a plurality of diffusion halls disposed on the upper support plate of the gas chamber." Applicants respectfully traverse the Examiner's rejection of claims 2 and 12 according to the argument set forth for claims 1 and 11 wherein a *prima facie* of anticipation was not made as Martin fails to disclose both a "common focus" and differing focusing distances. As a result, dependent claims 2 and 12

are not anticipated, since the independent claims from which they depend are not anticipated by Martin. Accordingly, Applicants respectfully request withdrawal of the rejection and reconsideration to place the present invention in condition for allowance.

C. Claim 7

The Examiner states with regard to claim 7 that Martin discloses "said gas chamber contains a parabolic reflecting mirror integrally formed with the support plate of the gas chamber adjacent to the infrared optical source formed at the support plate." Applicants respectfully traverse the Examiner's rejection of claim 7 according to the argument set forth for claims 1 and 11. As a result, dependent claim 7 is also not anticipated by Martin. Accordingly, Applicants respectfully request withdrawal of the rejection and reconsideration to place the present invention in condition for allowance.

D. Claim 9

The Examiner states with regard to claim 9 that Martin discloses "said infrared optical source is disposed on the focus of the parabolic mirror." Applicants respectfully traverse the Examiner's rejection of claim 9 according to the argument set forth for claims 1 and 11. As a result, dependent claim 9 is also not anticipated by Martin. Accordingly, Applicants respectfully request withdrawal of the rejection and reconsideration to place the present invention in condition for allowance.

VI. CLAIM REJECTIONS – 35 U.S.C. §103

Claims 3-6, 13 and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Martin. The Examiner states with regard to claims 3, 5, and 13 that Martin discloses "said gas

diffusion halls, but fails to teach said halls are covered by gas filters/detachable caps." The Examiner further states that the filters/caps are well known in the art and it would have been obvious to one of ordinary skill in the art to modify Martin by covering said diffusion halls to block unwanted gas/particles. Moreover, regarding claim 4 the Examiner states that Martin discloses a plurality of diffusion halls disposed on the axis of the incident light from the infrared sensor. Still further, the Examiner states regarding claims 6 and 14 that Martin discloses concave mirrors comprising highly reflective surfaces, but fails to teach mirrors plated by or deposited with gold, which according to the Examiner would have been obvious to one of ordinary skill in the art depending upon the needs of the particular application.

Applicants respectfully traverse the Examiner's rejection of claims 3-6, 13 and 14 under 35 U.S.C. §103(a) over Martin as there is no *prima facie* case of obviousness. MPEP §2142. Martin fails to teach or suggest all of the elements of Applicants claimed invention; namely Martin does not teach, suggest or provide any motivation for one of ordinary skill in the art to make an optical gas sensor wherein "the wall of the gas chamber is composed of two opposing concave mirrors having differing focusing distances but a common focus..."

Additionally, the Examiner has not provided any "convincing evidence" or articulated reasoning with rationale to support the legal conclusion of obviousness based on Martin. *KSR Int'l Co. v. Teleflex, Inc.*, 82 USPQ2d 1385, 1400 (2007) (requiring an identified reason to prompt a person of ordinary skill in the art to achieve the claimed invention based on the prior art). Accordingly, Applicants respectfully request withdrawal of the rejection and reconsideration in order to place the present application in condition for allowance.

VII. ALLOWABLE SUBJECT MATTER

Claims 16-25 are allowed. Claims 8, 10 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants' amendments to claims 1-5, 9-13 and 15 have amended the base claims to an allowable form; therefore, Applicants have not rewritten claims 8, 10 and 15 in independent form. Accordingly, Applicants respectfully request Examiner place the remaining claims 1-15 in condition for allowance.

VIII. CONCLUSION

This is a request under the provision of 37 CFR § 1.136(a) to extend the period for filing a response in the above-identified application for one month from April 9, 2008 to May 9, 2008. Applicant is a small entity; therefore, please charge Deposit Account No. 26-0084 in the amount of \$60.00 to cover the cost of the one month extension. Any deficiency or overpayment should be charged or credited to Deposit Account 26-0084.

No other fees or extensions of time are believed to be due in connection with this amendment; however, consider this a request for any extension inadvertently omitted, and charge any additional fees to Deposit Account No. 26-0084.

Reconsideration and allowance is respectfully requested.

Respectfully submitted,



JILL N. LINK, Reg. No. 62,123
McKEE, VOORHEES & SEASE, P.L.C.
801 Grand Avenue, Suite 3200
Des Moines, Iowa 50309-2721
Phone No: (515) 288-3667
Fax No: (515) 288-1338
CUSTOMER NO: 22885

- JNL/pw/bjh-

Attorneys of Record